

What is claimed is:

1. A precisely actuating member comprising:

a predetermined plate-shaped support portion;

5 a hinge portion of bottleneck structure extending vertically upward, which is integrated with said support portion, and runs from one end to the other end of said support portion; and

a rotating portion, which is integrated with said support

10 portion and said hinge portion, is connected by said hinge portion to be disposed on said support portion, and reciprocates and rotates precisely right and left on the axis of said hinge portion.

15 2. The precisely actuating member according to claim 1, wherein a mirror is attached to said rotating portion.

3. An image tilting device comprising:

a casing;

20 a precisely actuating means which is housed within said casing and is integrated therewith so as to precisely reciprocate;

a driving means which contacts to said precisely actuating member for the movement thereof; and

25 a light path conversion means, which is placed on said

precisely actuating means to be able to convert a light path by a precise movement.

4. The image tilting device according to claim 3, wherein

5 said precisely actuating means comprises:

a predetermined plate-shaped support portion;

a first hinge portion of bottleneck structure extending vertically upward, which runs from one end to the other end of said support portion; and

10 a rotating portion, which is connected by said first hinge portion to be disposed on said support portion, and precisely reciprocates and rotates right and left on the axis of said first hinge portion.

15 5. The image tilting device according to claim 4, wherein

said support portion is plural.

6. The image tilting device according to claim 5, wherein

said plurality of support portion is connected up and down 20 a second hinge portion of bottleneck structure extending vertically upward which runs from one end to the other end of said support portion.

7. The image tilting device according to claim 6, wherein

25 said second hinge portion is perpendicular to said first hinge

portion.

8. The image tilting device according to claim 4, wherein  
said precisely actuating means further comprises an adjustment  
5 screw for adjusting the initial angle of the support portion  
and the rotating portion.

9. The image tilting device according to claim 4, wherein  
said precisely actuating means further comprises a pre-pressure  
10 spring for adjusting the pre-pressure of said support portion  
and said rotating portion.

10. The image tilting device according to claim 4, wherein  
said driving means precisely rotates the rotating portion by  
15 contacting with the rotating portion of the precisely actuating  
member.

11. The image tilting device according to claim 10, wherein  
said driving means is a piezoelectric driving element which  
20 converts an electric energy into a mechanical energy to drive  
said precisely actuating member.

12. The image tilting device according to claim 11, wherein  
said piezoelectric driving element point contacts with said  
25 precisely actuating member.

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13. The image tilting device according to claim 12, wherein said precisely actuating means further comprises a plurality of balls for point contacts.

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14. The image tilting device according to claim 10, wherein said driving means is an electromagnetic driving element which generates a mechanical energy by a variation of magnetic field to precisely rotate said precisely actuating member.

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15. The image tilting device according to claim 14, wherein said electromagnetic driving element comprises:

a yoke, which has a predetermined shape for easily generating an electromagnetic force and being attachable to  
15 said precisely actuating member;

a permanent magnet for forming a magnetic field by attachment to said yoke; and

an electric wire, which is disposed between said yoke and said permanent magnet so as to form a magnetic field with  
20 said permanent field.

16. The image tilting device according to claim 15, wherein said predetermined shaped yoke has a plurality of branches disposed in parallel.

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17. The image tilting device according to claim 15, wherein said electric wire is a coil wound around the branches of said yoke.

5        18. The image tilting device according to claim 15, wherein said precisely actuating means comprises at least one connection, which contacts with said electromagnetic driving element, in order to transmit a mechanical energy of said electromagnetic driving element to said precisely actuating member.

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19. The image tilting device according to claim 15, wherein said electromagnetic driving element is disposed at both ends of said precisely actuating means.

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20. The image tilting device according to claim 4 or 6, wherein said support portion, said hinge portion, and said rotating portion are made of a material having an elastic restoring force.

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21. The image tilting device according to claim 20, wherein said material is aluminum.

22. The image tilting device according to claim 20, wherein said material is plastic.

23. The image tilting device according to claim 3, wherein  
said light path conversion means is a reflective mirror.

24. The image tilting device according to claim 3, wherein  
5 said light path conversion means is a refractive plate.

25. The image tilting device according to any one of  
claim 23 or 24, wherein said image tilting device further  
comprises:

10 a frame of a predetermined height which comprises a  
protrusion portion at one side for supporting said light path  
conversion member; and

15 a supporting member, which is covered at the other side  
of said protrusion portion of said frame to prevent said light  
path conversion member from bending.

26. The image tilting device according to claim 25, wherein  
said frame of said light path conversion member and said precisely  
actuating member respectively comprise a projection and a groove  
20 for assembly.

27. The image tilting device according to claim 26, wherein  
the image tilting device further comprises: a frame of said  
light path conversion means and a fastening spring for fixedly  
25 mounting the support member above the precisely actuating means.

28. A projection system comprising:

a light source, which generates a white light;

a color-processing means for imparting a predetermined

5 color to the white light from said light source;

a micro display means, which can display a predetermined image by using the light processed by said color-processing means;

at least one projection lens which projects an image  
10 displayed on said micro display means;

an image tilt means which precisely rotates the image inputted from said projection lens to then convert the path of the image to be transmitted; and

a screen, which magnifies and displays the image being  
15 rotated by said image tilt means.

29. The projection system according to claim 28, wherein  
said projection system further comprises an optical means for  
imaging the light processed by said color-processing means.

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30. The projection system according to claim 29, wherein  
said micro display means is disposed so that a pixel is reflected  
obliquely on said screen.

25 31. The projection system according to claim 29, wherein

said image tilt means precisely rotates so that the image reflected on said screen through said light path conversion means moves toward the direction of the diagonal axis of said screen in a reciprocating manner.

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32. The projection system according to claim 31, wherein said image tilt means precisely rotates on the diagonal axis of said light path conversion means.

10 33. The projection system according to claim 28, wherein said image tilt means comprises:

a casing;  
a precisely actuating means which is housed within said casing and is integrated so as to precisely reciprocate;

15 a driving means which contacts to said precisely actuating means to drive said precisely actuating means; and

a light path conversion means, which is disposed on said precisely actuating means to convert a light path by the precise movement thereof.

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34. The projection system according to claim 33, wherein said projection system further comprises a control wave generation means which generates a control wave to control the movement of said precisely actuating means.

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35. The projection system according to claim 34, wherein said control wave generation means generates a resultant wave of such a shape that the flat portion of a square wave is linked to the rising portion or the falling portion of a sine wave.

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36. The projection system according to claim 35, wherein the flat portion of said combination wave is composed of an upper flat portion and a lower flat portion, each flat portion having at least one step.

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37. The projection system according to claim 36, wherein said at least one step is symmetrical to one another at the upper flat portion and the lower flat portion.

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38. The projection system according to claim 33, wherein said precisely actuating member comprises  
a predetermined plate-shaped support portion;  
a first hinge portion of bottleneck structure extending vertically upward, which runs from one end to the other end  
20 of said support portion; and  
a rotating portion which is linked by said hinge portion to be disposed on said support portion, and precisely reciprocates and rotates left and right on the axis of said first hinge portion.

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39. The projection system according to claim 38, wherein said support portion is plural.

40. The projection system according to claim 39, wherein  
5 said plurality of support portions are linked up and down by a second hinge portions of bottleneck structure extending vertically upward which runs from one end to the other end of said support portion.

10 41. The projection system according to claim 40, wherein said second hinge portion is perpendicular to said first hinge portion.